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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/658,117	09/08/2003	Michail Konstantinos Tsatsanis	AKTINO.0002P	9686

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EXAMINER	
TRAN, KHANH C	
ART UNIT	**PAPER NUMBER**
2611	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/658,117	TSATSANIS ET AL.	
	Examiner	Art Unit	
	KHANH C. TRAN	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 December 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6 and 8-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *10-28* is/are allowed.

6)☒ Claim(s) *1-6,8 and 9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09/08/2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The Amendment filed on 12/07/2007 has been entered. Claims 1-6 and 8-28 are pending in this Office action.

Response to Arguments

2. Applicant's arguments with respect to claims 1-6 have been considered but are moot in view of the new ground(s) of rejection. ***See further explanation in the claim rejection below.***

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-6 and 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoosef et al. U.S. Patent 7,113,540 B2.

Regarding claim 1, Yoosef et al. invention may also be applied to equalizers servicing systems having Multiple Inputs and Multiple Output (MIMO) DFEs.

In column 16 lines 50-67, Yoosef et al. teaches in FIG. 8 a Multi-Input-Multi-Output (MIMO) digital communication system that operates to equalize a channel to

mitigate inter-symbol interference (ISI) that results from channel multi path propagation. In the embodiment of FIG. 8, an input symbol stream includes P unique transmitted signals. In column 17 lines 25-35, Yoosef et al. teaches the structure of FIG. 7 can be employed to implement the structure of FIGS. 8-11.

In light of that, referring to FIG. 7, the input symbol stream is pre-processed by PGA 712, ADC 714, time compensation section 716. The pre-processed input symbol stream is inputted to a MIMO FFE 804 having a matrix filter G(z) with length L; see column 19 lines 10-20. FIG. 7 further shows output from FFE 104.

Yoosef et al., however, does not expressly teach the matrix filter configured with a transfer function as set forth in the application claim.

In column 16 lines 55-65, because Yoosef et al. discusses that MIMO decision feedback equalization is used to mitigate inter-symbol interference (ISI) that results from channel multi path propagation, therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify matrix filter G(z) such that the transfer function is an inverse of the multi-path channels to counter the ISI effects.

Referring back to FIG. 7, since the FBE coefficients are computed by convolving the FFE coefficients with the channel impulse response h, FBE 108 filters the noise term to generate a noise cancellation signal, which is combined with output of FFE 104 to cancel unwanted noise of the output signals.

Further in column 8 lines 20-45, equations 25-26 illustrate that the optimal FFE coefficients can be configured as a block diagonal matrix.

Yoosef et al. does not expressly teach that the coupling does not comprise self FEXT.

As defined in paragraph [0005] of the original disclosure, the self crosstalk originates from the transmitters which are part of the coordinated multichannel transceiver. Further in column 1 lines 35-55, Yoosef et al. discusses that the channel distorts the transmitted symbols, from the perspective of the receiver, causing interference between a subject symbol and a plurality of symbols surrounding the subject symbol. This type of distortion is referred to as "inter-symbol-interference" and is, generally speaking, the time-dispersed receipt of multiple copies the symbols caused by multipath. In view of that, since the transmission channel distorts the transmitted symbols, one of ordinary skill in the art at the time the invention was made would have recognized that the inter-symbol-interference does not comprise self FEXT as claimed in the application claim.

Regarding claim 2, Yoosef et al. does not disclose the processing is discrete multi tone type processing as claimed in the application claim. However, since Yoosef et al. teachings apply to multi-channel applications, one of ordinary skill in the art at the time the invention was made would have been motivated to apply Yoosef et al. teachings to discrete multi-tone.

Regarding claim 3, referring to FIG. 7, the receiver section 702 includes FFE 104.

Regarding claim 4, in column 16 line 65 via column 17 line 10, the P transmitted signals are referred to in combination as transmitted signal vector x(n). The transmitted signal vector x(n) consists of a known training sequence followed by unknown data. In light of that, the transmitted signal vector x(n) is processed at the transmitter.

Regarding claim 5, as further disclosed in FIG. 7, the noise is a difference between output signal from matrix filter G(z) and output from slicer 106 for a particular channel.

Regarding claim 6, referring back to FIG. 7, a DSP processor 710 controls matrix filter (G(z) of MIMO FFE 104.

Regarding claim 8, FIG. 11 discloses a system including a wired digital communication system 1100 that includes a plurality of transmitters 1102A-1102G and a MIMO receiver 1104; see column 17 lines 64-67.

Yousef et al. does not specifically disclose fourteen channels.

In light of that, because wired digital communication system 1100 that includes a plurality of transmitters 1102A-1102G, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify Yousef et al. teachings to comprise fourteen channels. Furthermore, Applicants do not show the significance of two or more channels comprising fourteen channels.

Regarding claim 9, FIG. 11 discloses a system including a wired digital communication system 1100 that includes a plurality of transmitters 1102A-1102G and a MIMO receiver 1104; see column 17 lines 64-67.

Allowable Subject Matter

4. Claims 10-28 are allowed.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Amrany et al. U.S. Patent 6,999,504 B1.

Hasegawa et al. U.S. Patent Application Publication No. US 2003/0086362.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KHANH C. TRAN whose telephone number is (571)272-3007. The examiner can normally be reached on Monday - Friday from 08:00 AM - 05:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on 571-272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KCT

Khanh cong Tran

KHANH C. TRAN
PRIMARY EXAMINER

2/25/2008
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